



Penguin Conservation

The Penguin TAG Newsletter

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From the Editors

This issue has been published as a printed version, as well as electronically, to be included in the IPC9 packets. We are pleased to provide information on two conservation initiatives that aim to save endangered Humboldt and yellow-eyed penguins, the use of semen cryobanks to maintain the genetic diversity of penguin populations, the use of rehabilitation center data for passive disease surveillance monitoring, and how knowledge gained from observing wild penguins can be used to manage a medical condition in a zoo penguin.

This is the thirteenth issue of *Penguin Conservation Newsletter* and our seventh year of publication. We thank all those who have supported PCN by contributing content and through readership. Our sincere thanks to the Penguin TAG Steering Committee for funding the printing costs of this issue, and to Lauren Waller and the IPC Steering Committee for facilitating the printing and inclusion of this issue in the Congress packets. It is our goal to support the mission of the Penguin TAG by promoting conservation concern and action for penguins.

We thank our contributors; Michael Macek (St. Louis Zoological Park), David McFarlane (Yellow-eyed Penguin Trust), Dr. Justine O'Brien (SeaWorld and Busch Gardens Reproductive Research Center), Dr. Nola Parsons (SANCCOB) Ralph Vanstreels (University of São Paulo), Adam Schaefer (Florida Atlantic University), Vicki McCloskey (Steinhart Aquarium) and Kylene Plemons (SeaWorld).

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Editors: Linda Henry, Linda.Henry@SeaWorld.com
Jessica Jozwiak, jjozwiak@detroitzoo.org

Archived issues are available on the Penguin TAG website: www.zoopenguins.org

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The Center for Conservation in Punta San Juan, Peru: An Integrated and Focused Conservation Partnership

Michael Macek, *Curator of Birds, Saint Louis Zoological Park, St. Louis, Missouri, USA*

The Saint Louis Zoo has been involved in saving endangered species and their habitats around the world for decades. However, it was with the 2003 establishment of the Zoo's WildCare Institute that we began to devote our efforts to specific conservation programs globally and in our own backyard. The WildCare Institute takes a holistic-but focused approach to troubled ecosystems. Rather than try to do too much in many places, we are now more deeply involved in a dozen critical initiatives we identify as "WildCare Centers".

One such center is the Center for Conservation in Punta San Juan, Peru. The Center's goal is to secure the future of the threatened Humboldt penguin in Punta San Juan—home to almost half of the entire Peruvian breeding population. Here the continental shelf comes very close to the coastline creating an upwelling of cold, nutrient rich water, conditions that provide a fertile environment for the anchoveta, the primary prey species of the penguin and many other sea birds and marine mammals.

The foundation of the Center is the Punta San Juan Consortium. The Center and its partners have assembled a dedicated core team of institutions and professionals to monitor and steward Punta San Juan and its inhabitants. Consortium members include AZA member institutions: the Saint Louis Zoo, the Chicago Zoological Society, and the Kansas City Zoo; and Peruvian member, Cayetano Heredia University's Center for Sustainable Resources. To date the consortium has contributed over \$400,000 to protect the site via:

- ◆ The employment of two full-time biologists
- ◆ The maintenance of the wall that protects the reserve
- ◆ The maintenance of the research station
- ◆ Identification and solicitation of potential project funding sources

The WildCare center also works with consortium members and other partners on independent research projects in Punta San Juan. In 2007 the Center began a health assessment of the Humboldt penguin population in Punta San Juan. This project continues today. The Center now partners with the projects primary collaborator, the Chicago Zoological Society. To date approximately 1/5 of the entire Punta San Juan population has been assessed. The Center has also worked with the AZA Penguin TAG and Humboldt penguin SSP to help organize, raise funds and support three on site sustainable guano harvests. The most recent harvest in 2012 included 45 participants from more than 25 institutions representing six countries. Examples of other Center-supported projects include: the study of the variation in marine spatial dynamics of the Humboldt penguin and the implications on their conservation, the effects of nest site quality on Humboldt penguins breeding success, and the effects of implementing remotely operated cameras and drones for monitoring wildlife and enforcement.

The center has also initiated projects outside of Punta San Juan if the desired outcomes will also result in actions that benefit the Humboldt penguin. The most recent Humboldt penguin Population and Habitat Viability Assessment (PHVA) recommended the simultaneous censusing of the Peruvian and Chilean Humboldt penguin populations so that future management decisions could be based on refined models of the population status. The center has for the last 11 years partnered with Patty McGill Ph.D., Dallas Zoo, and three Peruvian NGOs (ACOREMA, APECO, and CSA) to conduct the annual census along the entire Peruvian Coast. We also collaborate with Education NGO, ACOREMA, to develop outreach and awareness materials in the area of Paracas, a major domestic tourist destination just north of Punta San Juan. ACOREMA has also helped to develop wildlife friendly protocols for local tour operators.

(Continued on Page 2)

Penguin TAG Steering Committee

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Penguin TAG Mission: To provide leadership for the management of penguins *ex situ* in order to maintain healthy, sustainable populations for the purpose of:

- ◆ Engendering appreciation for these charismatic species that are indicators of the health of marine and coastal environments.
- ◆ Promoting conservation concern and conservation action through education programs and internet resources.
- ◆ Furthering *in situ* conservation and research in support of *ex situ* management.

Penguin TAG Website: www.zoopenguins.org

Penguin TAG on Facebook: www.facebook.com/PenguinTAG

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The success of the Saint Louis Zoo WildCare Institute's Center for Conservation in Punta San Juan, Peru, lies in its collaboration and the partnerships it has cultivated. To date the Center has more than 25 partners ranging from zoos, universities and non-governmental agencies from around the world.



2012 Guano Harvest Team.



Marco Cardenas assisting with 2012 Guano Harvest.



ACOREMA 2015.



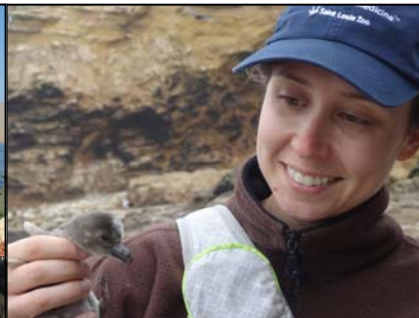
Children's Workshop ACOREMA.



Jose de la Torre Ugarte School 2015.



Anne Tieber, St. Louis Zoo, assisting with Humboldt census.



Samantha Griffin, St. Louis Zoo, assisting with 2016 Health Assessment.



Humboldt penguin bio-logging.



Humboldt penguins—taken during 2016 census.



Punta San Juan drone shot of Humboldt penguins and sea lions.

All photos courtesy of the St. Louis Zoological Park.

Yellow-eyed Penguins and IPC9 in South Africa: What Will Greet Delegates to IPC10 in Dunedin in 2019?

David McFarlane, *Field Manager, Yellow-eyed Penguin Trust, Dunedin, New Zealand*

Yellow-eyed penguins (*Megadyptes antipodes*) are facing unprecedented challenges to their survival in their mainland range (South Island & Stewart Island). In the 2015/16 breeding season only 206 active nest sites were recorded on the South Island mainland, around half of the 400 usually found. There is no indication that there will be an improvement in numbers this season.

Ironically, while we may be witnessing the slow demise of what is seen as a standalone yellow-eyed penguin conservation unit on the mainland, we essentially have no idea as to the health of the sub-Antarctic (Auckland & Campbell Island) population, often regarded as an insurance policy. Relying on such an “insurance policy” with no data to support it is nerve wracking indeed!



Yellow-eyed penguin. (YEPT).



Yellow-eyed penguin released from care. (YEPT).

As reported previously these conservation challenges have inspired the Trust to launch two major initiatives – the appointment of Dr Trudi Webster (representing the Yellow-eyed Penguin Trust at IPC9) and the employment of a vet, Dr Lisa Argilla. Dr. Webster will advise and lead research with emphasis on marine issues affecting yellow-eyed penguin productivity, and brings science alongside our conservation management. Dr. Argilla will return in the 2017 critical chick fledging period to once again offer skilled veterinary care to injured or sick penguins.

We urge you to consider supporting the Yellow-eyed Penguin Trust in our conservation work. As well as working collegially with Dr. Webster on marine issues affecting yellow-eyed penguins, there are opportunities for supporting both the build of our new research facility and work base in the Catlins (designed to support intensive yellow-eyed penguin management interventions); and the proposed Dunedin Wildlife Hospital. Meet Dr. Webster in person at IPC9 and email her on: science-advisor@yeptrust.org.nz.

The Trust believes that your support will help greatly in assisting with the conservation of these rare penguins and we look forward to hosting delegates to IPC10 at our reserves in Dunedin and the Catlins in 2019.

Keepers Help and Learn at SANCCOB

“I have worked with many species of animals, including several species of penguins at the SeaWorld San Diego Penguin Encounter. That’s why I’m so excited to be in South Africa helping the endangered African penguins. I’m working right alongside the leaders of African penguin conservation. We’re going to be tagging African penguins and looking at population studies. We’re also going to be looking at the quality of their nest sites and even doing some beach clean-ups. A big reason we’re doing this is we need to find the problems in order to find solutions. I’m so excited to be here.”

—Kylene Plemons, 25 July 2016.



Kylene Plemons (on the right above), SeaWorld San Diego, helps at SANCCOB. (K. Plemons).

Maintaining the Genetic Diversity of Penguin Populations: Chicks Hatched from Artificial Insemination With Cryopreserved Semen in the Magellanic Penguin (*Spheniscus magellanicus*)

Justine K. O'Brien, PhD, *Scientific Director, SeaWorld Parks and Entertainment, Inc., SeaWorld and Busch Gardens Reproductive Research Center, San Diego, California, USA*

Artificial insemination (AI) and sperm cryobanks are valuable tools for maintaining the genetic diversity of zoological populations in conjunction with natural breeding efforts. AI using frozen-thawed sperm can facilitate the breeding of genetically under-represented individuals and the introduction/reintroduction of valuable genetics into a population well after a male has died or become reproductively senescent. AI and sperm cryobanks could enhance the management of zoological penguin populations in other ways, through reducing the need to transport animals for breeding loans and associated disease introduction risks. Previous research by our group on male and female Magellanic penguin reproductive biology has enabled the development of effective AI and chilled semen storage methods.^{1,2} For those AI procedures, females were maintained in nest sites that permitted visual, auditory, and tactile contact with their paired mate but not copulation, and male-female pair bonds remained intact. High rates of fertility (92%) and hatchability (64%) were observed after insemination of females with chilled sperm from a genetically compatible male(s) that was not their paired mate.² The next stage of our research was to examine the fertility of cryopreserved sperm following thawing and AI with trials conducted during the 2014 and 2015 breeding seasons. Results indicate that a population of frozen-thawed sperm remain fully functional after thawing, and are able to reside in the female reproductive tract up to 7 days prior to fertilization. Inseminations every 7-10 days using frozen-thawed sperm (with 1-2 inseminations per female per breeding season) resulted in 58% fertility (7/12 eggs), with four chicks hatching after a 39-41 day incubation (57% hatchability) and genetic analyses determining that all conceptions were derived from the AI sire. Females undergoing the aforementioned insemination regimen displayed normative profiles of plasma hormone production and biochemistry parameters, and an average egg formation interval of 29.8 days ($n = 6$ breeding cycles). The occurrence of prolonged, unsuccessful breeding cycles in two Magellanic penguin females receiving twice-weekly inseminations ($n = 2$ breeding cycles) may reflect inhibitory effects of stress responses on key reproductive events like ovulation, and indicate that inseminations should occur no more than once weekly to avoid such effects. Overall, our findings support the use of sperm cryobanking and AI using a once weekly insemination regimen for managing the sustainability of zoological populations of the Magellanic penguin. These advancements also have implications for the conservation of threatened penguin species.



Magellanic penguin chicks produced using artificial insemination. The first chick of any penguin species produced using frozen-thawed sperm is shown on the left (MG0184). Photograph: M. Aguilera, SeaWorld San Diego.

The above is a summary from a published article. The full citation is as follows:

O'Brien JK, Steinman KJ, Montano GA, Dubach JM, Robeck TR. 2016. Chicks produced in the Magellanic penguin (*Spheniscus magellanicus*) after cloacal insemination of frozen-thawed semen. *Zoo Biology* doi: 10.1002/zoo.21304 (published on-line Jun 18 2016).

A pdf of the journal article can be obtained by contacting justine.obrien@seaworld.com

Literature cited:

1. O'Brien JK, Schmitt TL, Nollens HH, Dubach JM, Robeck TR. 2016. Reproductive physiology of the female Magellanic penguin (*Spheniscus magellanicus*): insights from the study of an *ex situ* colony. *General and Comparative Endocrinology* 225:81–94.
2. O'Brien JK, Nollens HH, Schmitt TL, Steinman KJ, Dubach JM, Robeck TR. 2016. Male reproductive physiology and the development of artificial insemination in the Magellanic penguin (*Spheniscus magellanicus*) using chilled-stored semen. *Journal of Zoo and Wildlife Medicine* 47:206–222.

Rehabilitation Centres' Role in Passive Disease Surveillance Monitoring

Nola Parsons, SANCCOB, South Africa, Ralph Vanstreels, University of São Paulo, Brazil, Adam Schaefer, Florida Atlantic University, Florida, USA

Passive disease surveillance monitoring based on data from seabird rehabilitation centres is limited by the opportunistic nature of the sampling and by the unpredictability of the factors modulating seabird admission, for example, uneven beach survey effort, difficulties in storage and transport from seabird colonies, different human and bird population density along the coastline, differences in individual health and behaviour, among others. This affects the interpretation of these epidemiological studies. However, this work can be instrumental for the identification of novel host-parasite associations and can provide valuable insight on the pathology of parasites that are otherwise uncommon or from hosts that are infrequently sampled in the wild.

SANCCOB (the Southern African Foundation for the Conservation of Coastal Birds) works closely with the South African seabird colony management authorities, in particular CapeNature and South African National Parks (SANParks), and has devised disease surveillance guidelines and practical operating procedures in order to facilitate the effective transport of live birds and fresh carcasses to its rehabilitation centres for further examination and sampling. Data collected currently includes blood smear examination and post mortem examination data, including further tests such as histopathology and bacteriology. This data is used to collate knowledge of what pathogens and parasites are present in wild African penguins and other seabirds. Collaboration is vital for disease surveillance, from collection of birds to post-mortem examination, laboratory tests, information management, data analysis and communication. Funding the capacity to be able to do this work, as well as to pay for laboratory testing, is often a limiting factor but SANCCOB has been fortunate to receive support from institutions such as the Sea Research Foundation (Mystic Aquarium), Georgia Aquarium and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).

In a changing climate in which the prevalence and distribution of pathogens and parasites is expected to shift, marine animal rehabilitation centres must use the opportunity to collect data and conduct research that will contribute to our understanding of how the health of marine fauna is affected by the anthropogenic (and non-anthropogenic) pressures and how this may affect their conservation.

Figure 1. In 2010 and 2011, there were eight positive cases of herpesvirus-like infection in the respiratory systems of African penguin chicks that died after being admitted to SANCCOB for hand-rearing. The virus was only present in a small proportion of the chicks and had an uncertain role in the overall respiratory disease syndrome, but was determined to be present in the wild. The development of more sensitive diagnostic methods is recommended to clarify the significance of these infections (Parsons et al., 2015. *Diseases of Aquatic Organisms* 116: 149-155).

Figure 2. Spirochaetes, determined to be relapsing fever *Borrelia*, were observed on blood smears from less than 2% of African penguins admitted for rehabilitation in both the Eastern and Western Cape provinces. Prevalence rates were higher in chicks and juveniles compared to adults and during summer months compared to winter months. Most birds were released with no antibiotic treatment (Yabsley et al., 2012. *Parasitology Research* 110: 1125-1130).

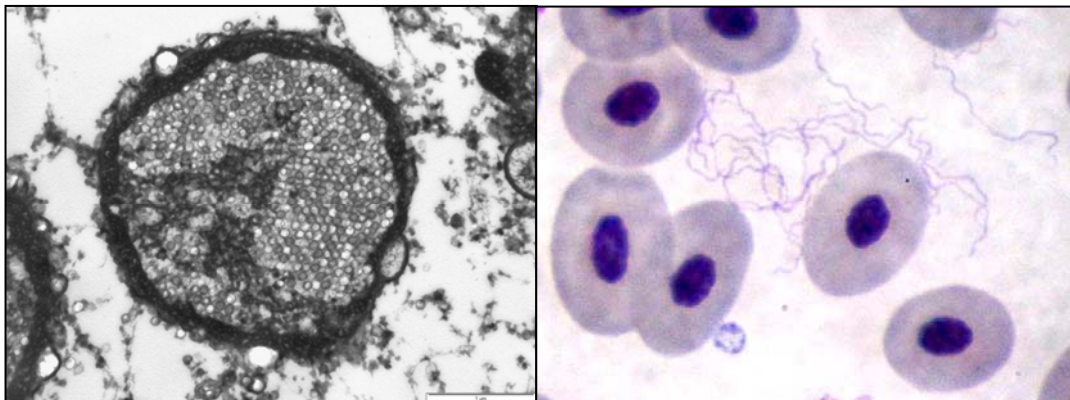


Figure 1

Figure 2

Managing an Amputee African Penguin Chick

Vicki McCloskey, Assistant Curator, Steinhart Aquarium, California Academy of Sciences, San Francisco, California, USA

Steinhart Aquarium at the California Academy of Sciences maintains and manages an indoor colony of African penguins (*Spheniscus demersus*). We presently house six adult mated pairs, one adult female and three juveniles. Since the opening of our new facility on September 27, 2008, two of our four Species Survival Plan (SSP) recommended pairs have successfully hatched eight chicks. When one of these chicks was removed from the nest box at 30 days old, biologists noted that his right foot was starting to curl under. The chick, which hatched on May 4th, was dubbed 'Curry Skywalker' by the Aquarium staff in honor of the Golden State Warriors and their quest for the NBA Championship.



Curry's right leg after foot amputation. (V. McCloskey).

The vet staff examined Curry's foot and he was diagnosed with a medial slipped Achilles tendon. Though the surgery to reattach the tendon was successful, he then developed a post-surgical joint infection. We managed to resolve the infection with antibiotics, but in that time the joint space had increased and become unstable. Multiple surgical attempts to stabilize/fuse the joint were made, but to no avail. We contacted staff at the Santa Barbara Zoo regarding their Humboldt penguin (*Spheniscus humboldti*) who wears a waterproof bootie to help correct a similar condition, and they sent us some samples to try. Unfortunately, the bootie was not the

best option for Curry because he did not have enough bone mass in the foot for support. By this point in time he was eight months old and biologists were worried about his general welfare. The multiple surgeries prevented him from being able to get in the water, and his demeanor became somewhat depressed. The husbandry and veterinary staff decided it would be in Curry's best interest to amputate the foot. Husbandry staff felt confident that Curry would be able to successfully adjust; they had observed one-footed birds in the wild while working at SANCCOB.

After recovering from the surgery, Curry was able to swim normally, and walk upright at a slow pace using the stump. He preferred to lay sternal when at rest and if he got startled or moved too fast, he would not run so much as 'hop-run'. The holding room where he had been living has a small in-ground pool with gradual steps for access. Biologists modified the pool with a Fiber Glass Reinforced Plastic (FRP) ramp when chicks are first learning to swim. Curry was able to access the pool using this ramp, though he tended to rely heavily on his wings for help. Our exhibit space is modeled after Boulders Beach, South Africa, and has fairly steep access points. We were not convinced that Curry would be able to navigate the rockwork in the exhibit pool, so we contacted the African penguin SSP and asked for help placing Curry in a facility that was more conducive to his special needs. Pueblo Zoo responded immediately with an offer to take him. They have several older birds in their colony and a more navigable exhibit space. Pueblo penguin staff paired Curry with a younger female in quarantine and they have recently begun to integrate him into their colony. Supervised introductions to the exhibit have started, and the community can keep apprised of Curry's progress by checking Pueblo Zoo's Facebook page at:

<https://www.facebook.com/pueblozoo/?fref=nf>. You can also follow him on Instagram! #CurrySkywalker.

In the future, Pueblo may have the opportunity to collaborate on designing a prosthetic with a local college that possesses a 3D printer. The husbandry and veterinary staffs feel that something simple to extend the stump and give it a wider base may work better than an actual 'foot' design which may impede mobility and be harder to maintain. Stay tuned...

We would like to thank everyone in the AZA penguin community for their guidance and support during this process. We especially thank the Steinhart Aquarium Penguin Team, the Steinhart Aquarium Animal Health Department, Freeland Dunker (DVM, Steinhart Aquarium, California Academy of Sciences), Ashley Bowen (General Curator, Pueblo Zoo), the Pueblo Zoo Penguin Team, Rachel Ritchason (Curator of Birds, Santa Barbara Zoo), Steve Sarro (Curator, National Zoological Park), and Gayle Sirpenski (Animal Management Specialist, Mystic Aquarium).



"Curry Skywalker", an African penguin with a medial slipped Achilles tendon. (V. McCloskey).



Curry using stump to stand upright. (V. McCloskey).

News and Updates

The Maryland Zoo hosted the recent **African Penguin SSP** (Species Survival Plan) meeting to discuss future conservation efforts for the African penguin in North America. This meeting marked the **20th anniversary** for the SSP. Nationwide, there are fifty AZA-accredited zoos and aquariums exhibiting nearly 800 African penguins that are part of the AZA SAFE (Saving Animals From Extinction) Program. Learn more at www.aza.org/safe.

New regulations targeted at protecting the waters around the Galapagos were signed by Ecuadorian President Rafael Correa in March. The law supplements the existing marine protected area by creating sanctuaries around Darwin and Wolf Islands with designated “no take” zones that will prohibit fishing, drilling or mining. Isabela Island is included the protections. Read the full story at <http://www.washington.edu/news/2016/04/06/marine-preserve-to-help-penguins-in-a-predictably-unpredictable-place/>.

Many thanks to the Global Penguin Society (GPS) for being a major sponsor for the **early career scientist workshop** in South Africa preceding the IPC9 (www.globalpenguinsociety.org).

Congratulations to Dr. Dee Boersma who was one of six finalists for the 2016 Indianapolis Prize. Learn more at <http://www.indianapolisprize.org/sites/prize/SitePages/Home.aspx>.

The **UNESCO Biosphere Reserve “Blue Patagonia”** celebrated its **one-year anniversary** in June. This reserve, which was supported in part by the GPS, includes the coastal area of Argentina with the highest biodiversity and protects more than 650 species.

The Detroit Zoo opened their new **Polk Penguin Conservation Center** in April, the largest penguin facility in the world.

A new study by lead author Megan Cimino suggests that **Adelie penguins may experience population declines** and a southward shift in range by 2060 from warmer water and loss of sea ice in the Antarctic. Historic satellite data was used along with climate models to estimate future impacts.

The 2016 AZA Regional Population Analyses & Breeding and Transfer Plans have been completed for the following species: Northern Rockhopper, Southern Rockhopper and King. Updated AZA Regional Studbooks have been completed for the following species: African, Macaroni, Southern Rockhopper and King.

The Animal Demography Unit (<http://adu.org.za>) at the University of Cape Town shared a photo on Facebook of an **African penguin banded L6486**. Margaret Maclver, CapeBirdNet <https://groups.yahoo.com/neo/groups/capebirdnet/conversations/messages/16538>, researched the band and found that L6486 had been a rescued and hand-reared chick banded during the 2000 Treasure Oil spill. Sixteen years later, this bird has survived and is looking good at Stony Point.

The book, **“Pinguinos; Historia Natural y Conservacion”** (Penguins: Natural History and Conservation), published by GPS in Argentina won an award for the “best book edited in Argentina” by the Argentina Chamber of Publications. Congratulations to authors Drs. Popi BorBoroglu and Dee Boersma and Editor Vazquez Mazzini.

The Japan Times reports that the Kaiyukan Aquarium, Osaka, Japan, **announced the first successful artificial insemination (AI) of a southern rockhopper penguin**. The chick was hatched on June 6. Sperm obtained from Tokyo Sea Life Park was used to inseminate three female penguins in April. DNA confirmed that one of the chicks was conceived via AI. <http://www.japantimes.co.jp/news/2016/06/24/national/osaka-aquarium-boasts-first-successful-artificial-insemination-endangered-penguin/#.V5e5r4-cHIU>.

Events and Announcements

- ◆ **International Penguin Congress 9**, 5-9 September 2016, Cape Town, South Africa. **WELCOME!**
- ◆ **American Zoo and Aquarium (AZA) Annual Conference**, 7-11 September 2016, San Diego, CA; Hosted by [San Diego Zoo Global](http://www.sandiegozoo.org/global) and [SeaWorld San Diego](http://www.seaworld.org).
- ◆ **Avian Egg Incubation Workshop**, 19-22 September 2016. Hosted by the Albuquerque Zoo and BioPark; Contact Keith Crow 505-764-6239; kcrow@cabq.gov.
- ◆ From South Africa, Australasia and the Galapagos to Antarctica, penguins are at risk. Host an event to mark one of these days and help raise awareness and inspire conservation action:

African Penguin Awareness Day, 15 October 2016

Penguin Run/Walk, 15 October 2016, Mystic Aquarium, Connecticut <http://www.mysticaquarium.org/visit/calendar/details/586-penguin-run-walk-2016>.

Penguin Awareness Day, 20 January 2017.

International Earth Hour, 25 March 2017 <https://www.earthhour.org/>.